

# Planning for Resilience in Norfolk

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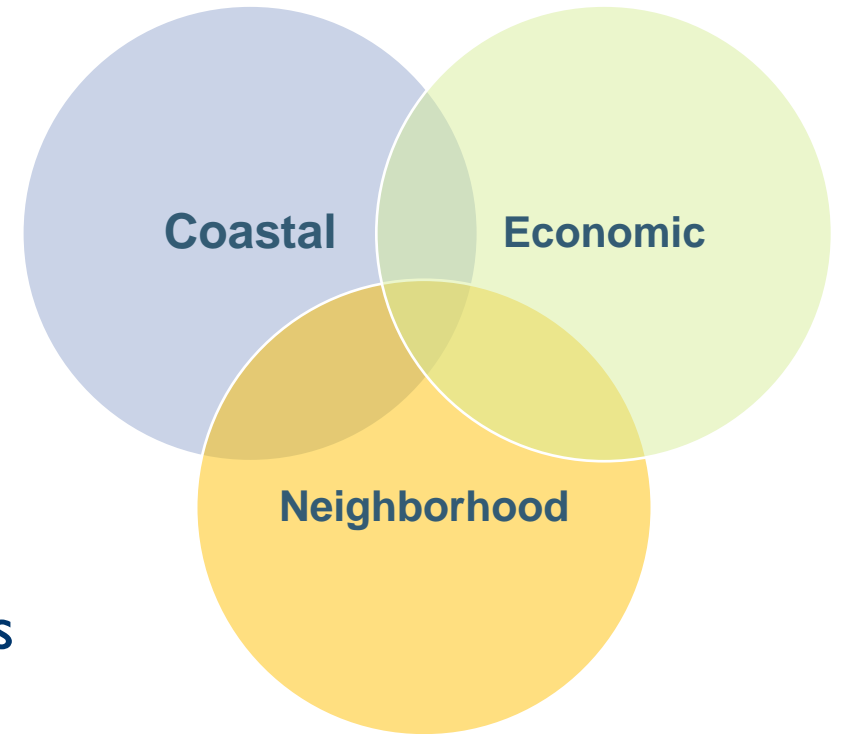
Planning Director, City of Norfolk





# Resilience in Norfolk

- **Norfolk's Resilience Challenges**
  - **Coastal Resilience**
    - Increasing sea level rise and flood risk
  - **Economic Resilience**
    - Overreliance on two industries
  - **Social (Neighborhood) Resilience**
    - Concentrated poverty; disconnected communities

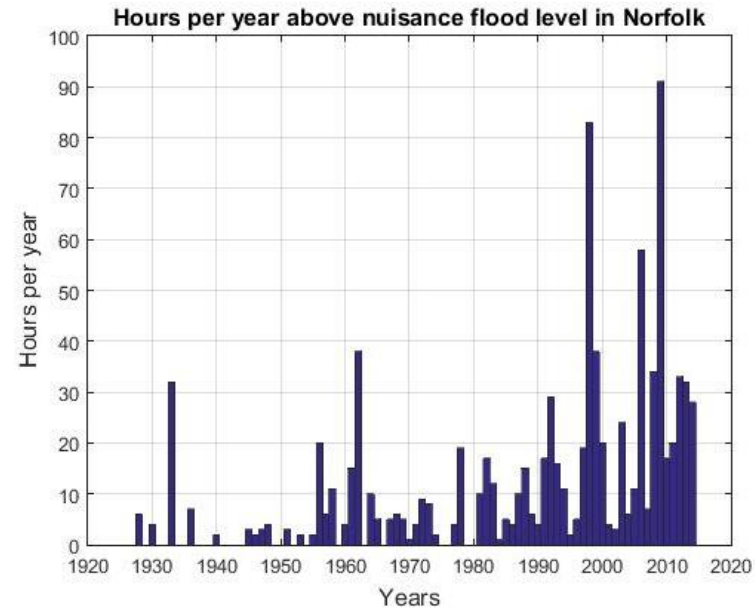


# Norfolk's Long History of Flooding



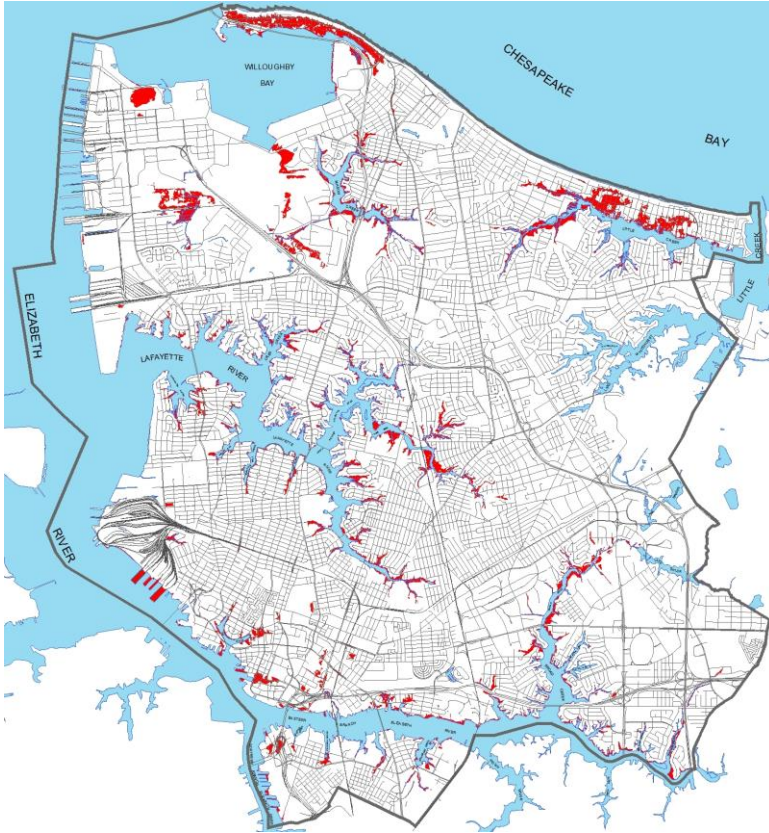


# Flooding is Only Getting More Common

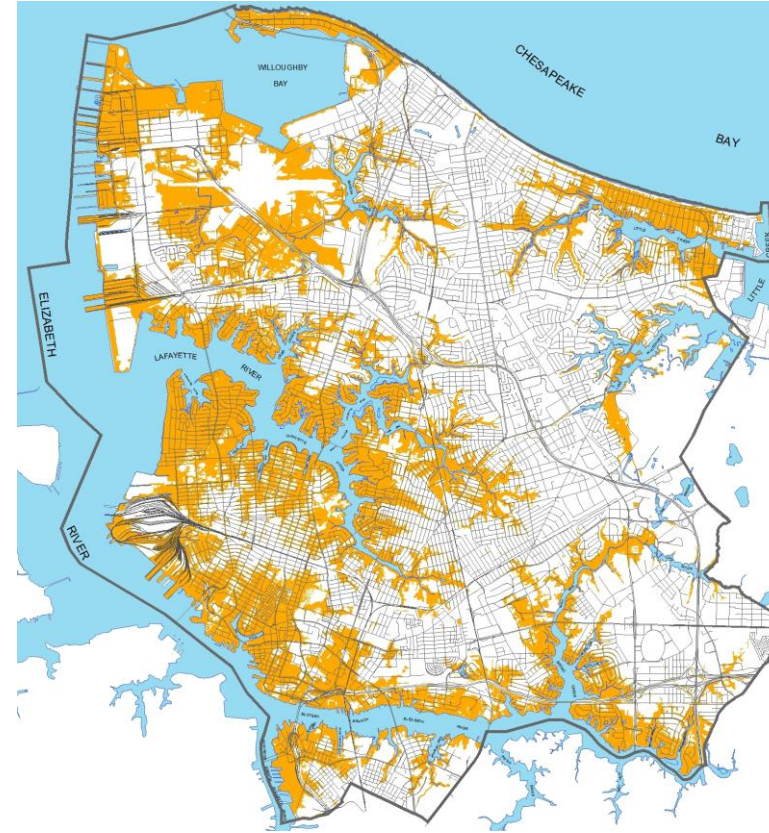




# Increasing Sea Level Rise and Flood Risk

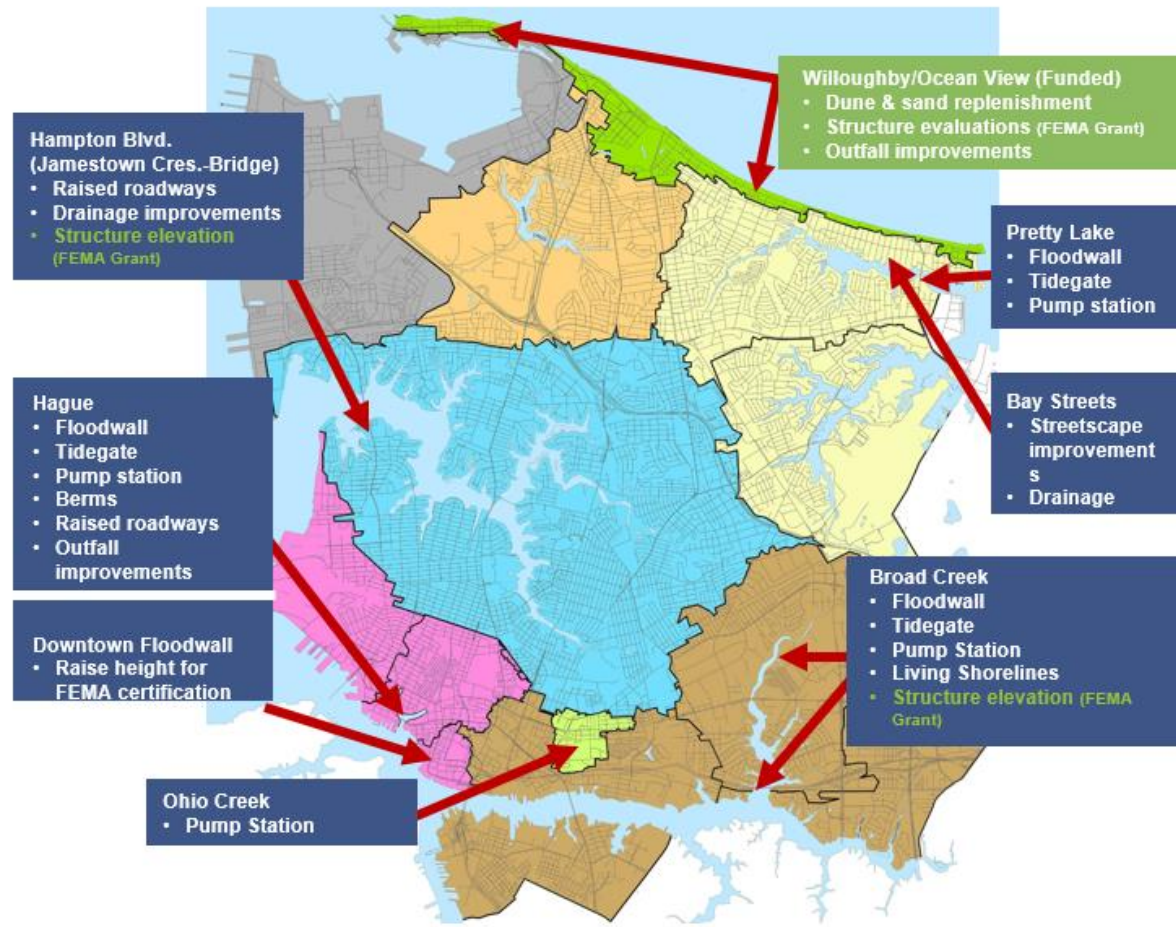


Sea levels with 2-3 feet of  
(relative) water rise



Flood zones with 2-3 feet  
of (relative) water rise

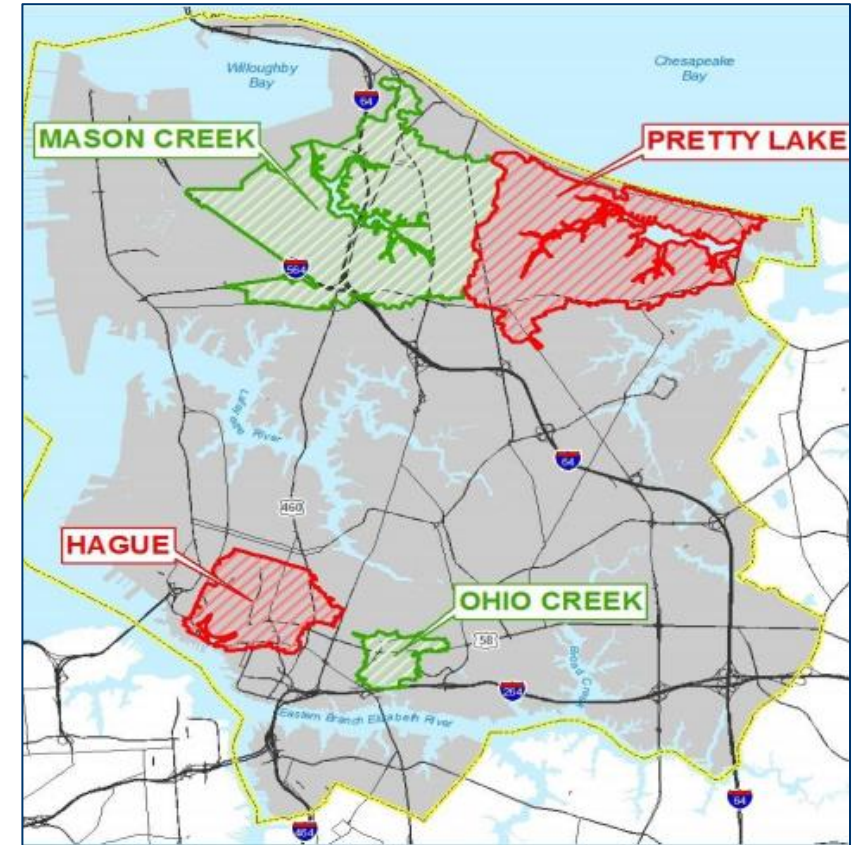
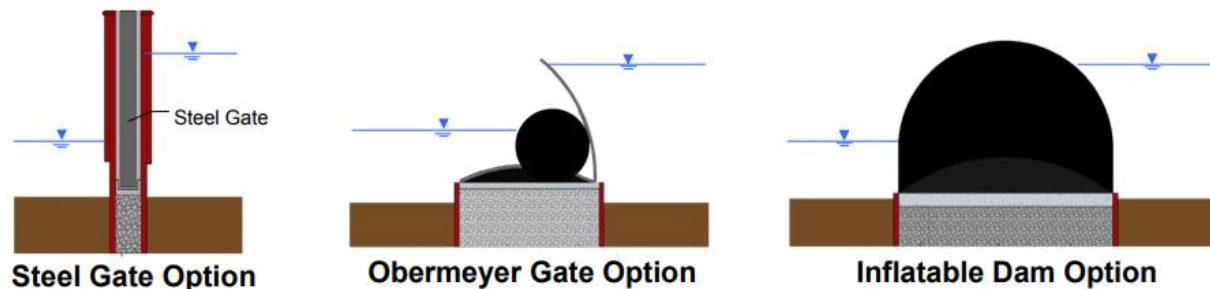
# The Traditional Approach – Stop Flooding





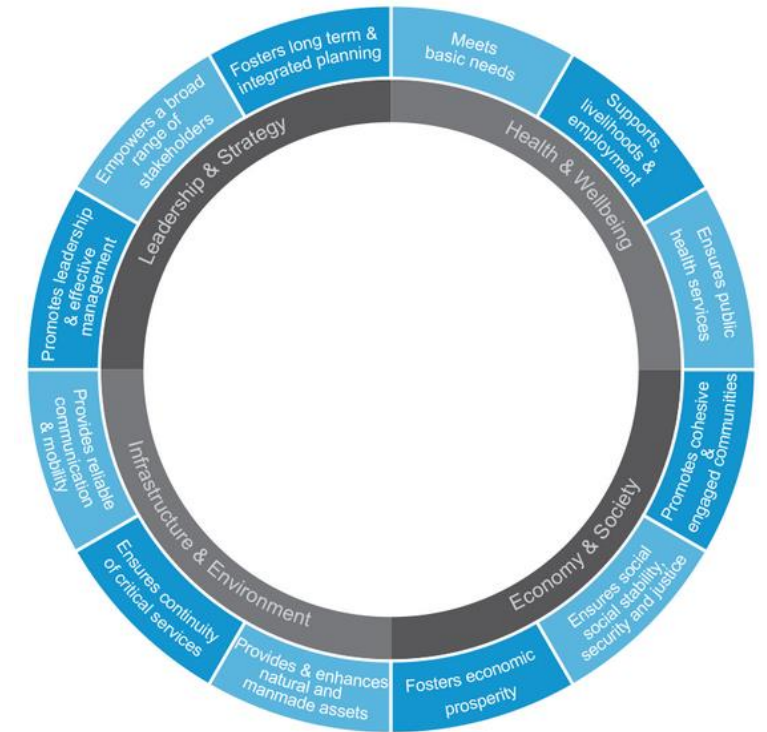
# Coastal Flooding Study (2012)

- City identified four basins to study, with the following characteristics
  - Recurrent flooding
  - Narrow tidal mouths
  - Simpler implementation solutions (flood gates, etc.)



# 100 Resilient Cities

- Norfolk became one of the Rockefeller Foundation's 100 Resilient Cities in 2013
  - International network of cities dedicated to becoming more resilient to the physical, social, and economic challenges that are a growing part of the 21st century
  - RCI100 defines resilience as the capacity of individuals, communities, and systems to survive, adapt, and grow in the face of stress and shocks





# Resilience Initiatives

- Comprehensive Resilience Strategy
- Fort Norfolk ULI Study
- Re:Invest
- Dutch Dialogues Virginia
- Ohio Creek NDRC Implementation
- Vision 2100
- ZoneNorfolk
- JLUS



# Norfolk's Resilience Strategy

- Norfolk completed its comprehensive resilience strategy in 2015
- Three challenges were identified:
  - Coastal Resilience
    - Increasing sea level rise and flood risk
  - Economic Resilience
    - Overreliance on two industries
  - Social (Neighborhood) Resilience
    - Concentrated poverty; disconnected communities

Milan \* New York City \* Quito  
Melbourne \* Boston \* Bangalore  
Rotterdam \* Athens \* Paris  
Dakar \* Juarez \* Phnom Penh  
Thessaloniki \* Norfolk, Virginia  
Medellín \* Bangkok \* Rio de  
Janeiro \* Barcelona \* Los Angeles  
Rome \* Chicago \* Da Nang \* New  
Orleans \* Cali \* Kigali \* Huangshi  
Singapore \* Mexico City \* Lisbon  
Santiago de los Caballeros \* San  
Francisco \* Belgrade \* Ramallah  
Glasgow \* Montreal \* Mandalay  
Accra \* Jacksonville \* London  
Toyama \* Ashkelon \* El Paso  
Dallas \* Jacksonville \* Pittsburgh  
San Juan \* Durban \* Semarang  
Sydney \* Amman \* Vejle \* Enugu  
Porto Alegre \* Surat \* Santiago  
Metropolitan Region \* Deyang  
Wellington City \* St. Louis \* Byblos  
Arusha \* Christchurch \* Tulsa  
Chennai \* Oakland \* Bristol  
Santa Fe \* Berkeley \* Boulder

**NORFOLK** RESILIENT CITY



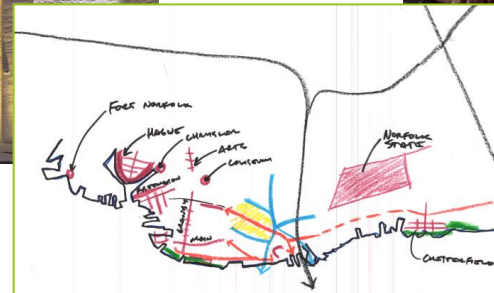
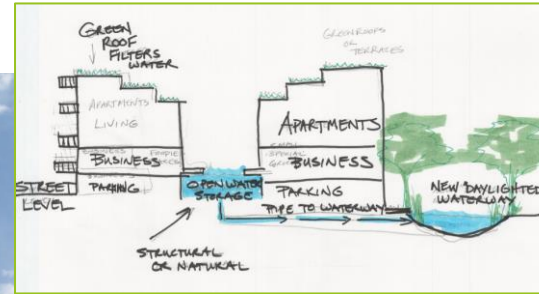


## Goals of Resilience Efforts:

- Design the coastal community of the future
- Create economic opportunity by advancing efforts to grow existing and new sectors
- Advance initiatives to connect communities, deconcentrate poverty, and strengthen neighborhoods.

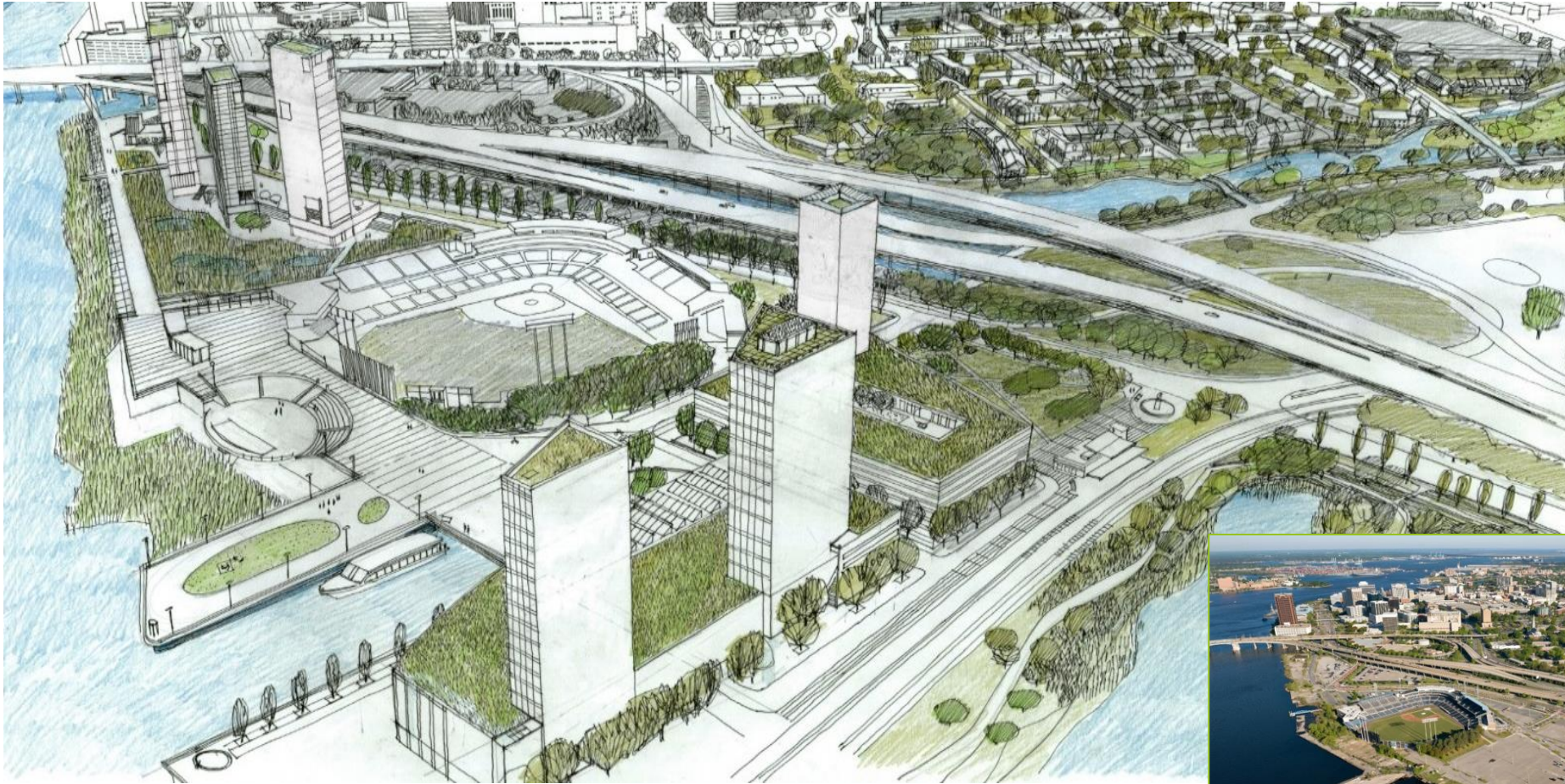


# Dutch Dialogues Norfolk (2015)





# Transforming the Waterfront

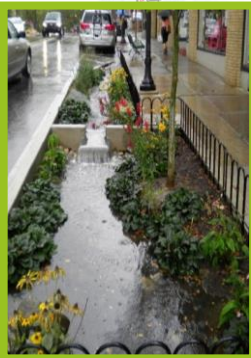




# A Comprehensive Set of Solutions



Rain Gardens



Constructed Wetlands



Protected Coastal Wetlands



Waterfront Parks



Retention Ponds

Permeable Parking Lanes



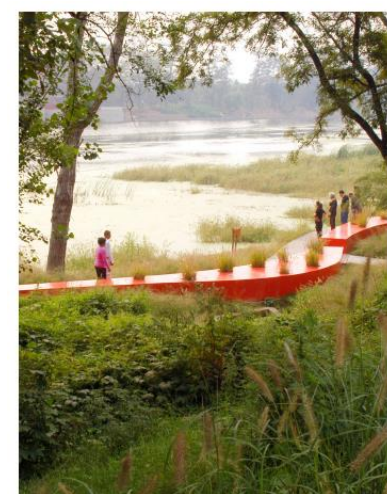


# Ohio Creek Implementation Project (2017)

- Major implementation of Dutch Dialogue concepts
  - Funded through NDRC grant
  - Goal to provide additional 3 feet of flood protection capacity along 2 miles of shoreline
  - Achieving co-benefits is a key driver



# Shoreline Protection and Stormwater Control





# Shoreline Protection and Stormwater Control



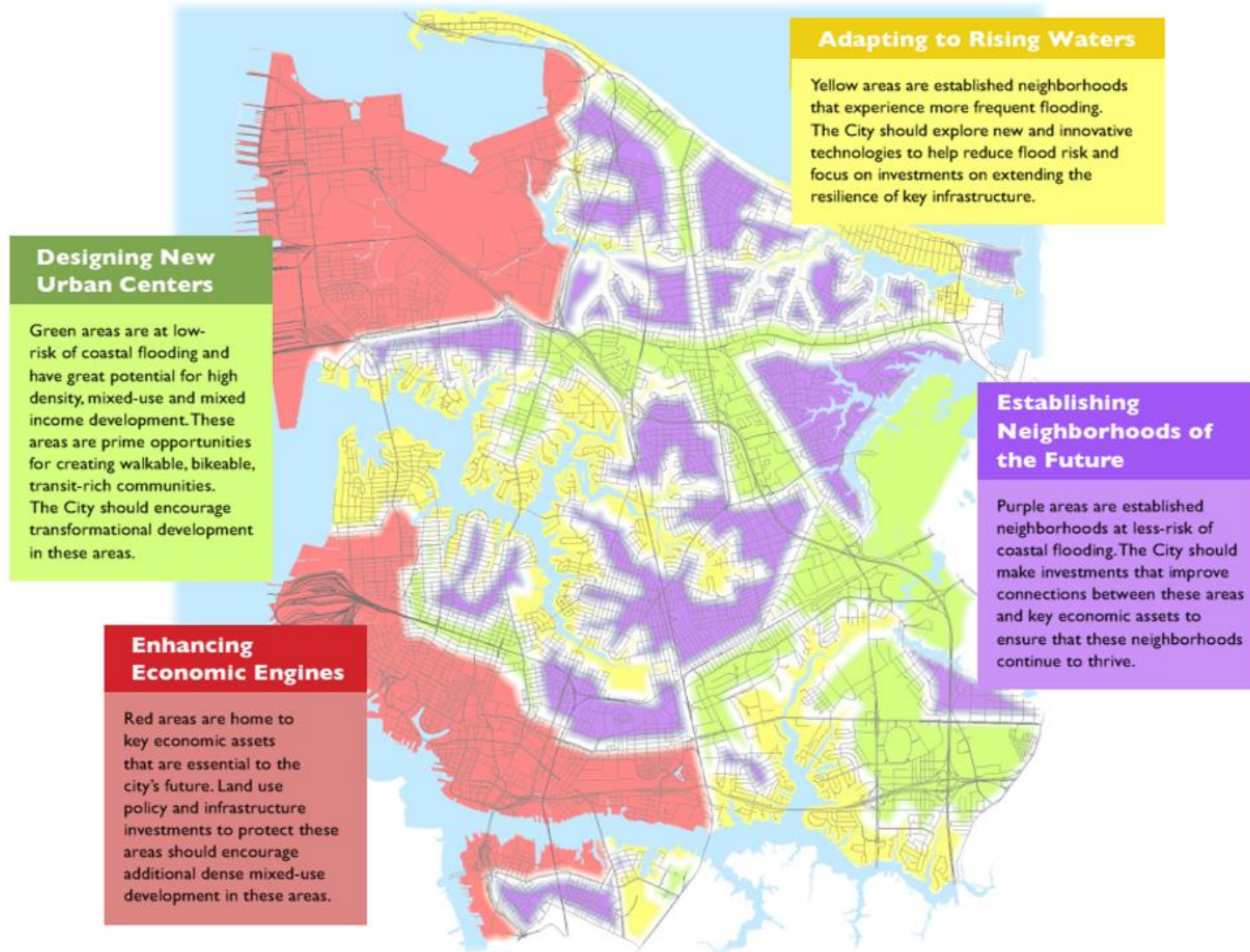
# Vision 2100 (2016)

- Strategy for addressing sea level rise in long-term future
  - In the past, the focus was on the challenges
  - In the future, those challenges will give rise to opportunities
- Opportunity to bring visionary long-term thinking into Norfolk's Comprehensive Plan





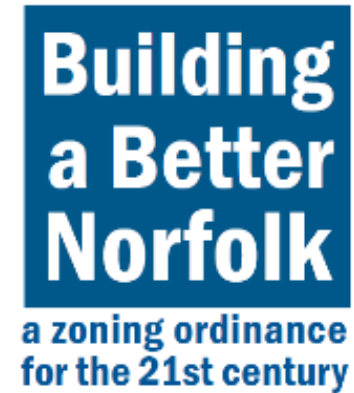
# Vision Areas



# ZoneNorfolk (2018)

## Norfolk's Zoning Ordinance Rewrite

- Norfolk's current ordinance was adopted in 1992
  - New Comprehensive Plan, adopted in 2013, calls for new ordinance
- Norfolk hired Clarion Associates in mid-2014 to re-write ordinance
  - 3+ year process, to be adopted around end of 2017
- Overall goal → create the most resilient ordinance in America



Adopted 23 January  
2018





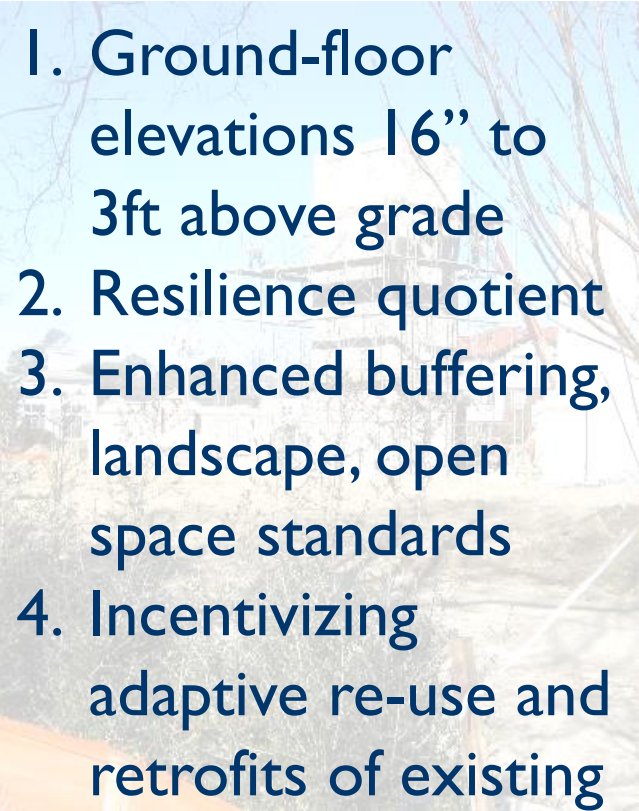
# Citywide Resilience Zoning Strategy

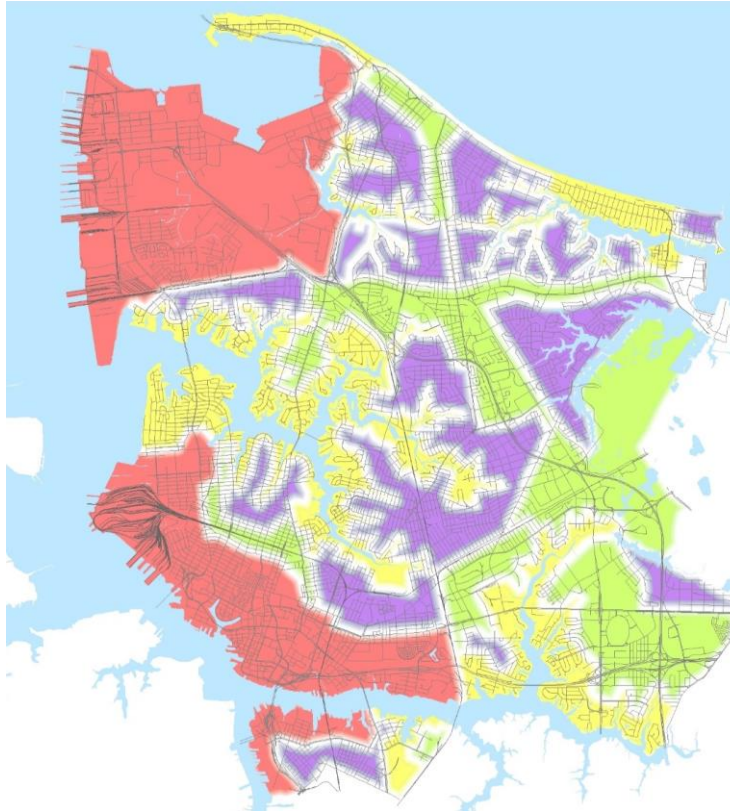
How do we increase flood resilience in a city that is 97% developed...



...with a middling construction market?

# Citywide Resilience Zoning Strategy

- 
1. Ground-floor elevations 16" to 3ft above grade
  2. Resilience quotient
  3. Enhanced buffering, landscape, open space standards
  4. Incentivizing adaptive re-use and retrofits of existing buildings



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5. Coastal Resilience Overlay
  6. Upland Resilience Overlay
  7. Neighborhood Resilience Overlay



# Resilience Through Zoning

Norfolk adopted the most stringent freeboard requirement in region in 2013:

- 3 feet in SFHA
- 18" in Shaded X
- Other localities followed
- 16"-24" everywhere else in City as part of new Zoning Ordinance

## Freeboard in SFHA

BFE	Franklin, Matthews County, Suffolk, Williamsburg
1 ft.	Cape Charles, Richmond, Southampton County
1.5 ft.	Chesapeake, Isle of Wight County, Lancaster
2 ft.	Accomack County, Chincoteague, Gloucester, James City County, Newport News, Northumberland County, Roanoke, Virginia Beach
3 ft.	Hampton, <u>Norfolk</u> , Poquoson, Wachapreague, York County

## Freeboard outside the SFHA (Shaded X Zone)

18" above grade	Hampton, <u>Norfolk</u>
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# Resilience Quotient

## *Creating the most resilient zoning ordinance in America*

- Encouraging the use of resilient technologies
- Stormwater management
- Risk mitigation
- Energy resilience
- Required of new development

### C. ALTERNATIVE MINIMUM

Any multiple dwelling unit residential development shall comply with the resilience quotient standards for residential development shown in Table 5.12.6, Resilient Point System for Residential Development, based on the number of dwelling units within the development as shown below.

- (1) 1 to 5 units: 4 points total, no less than 1 point per component.
- (2) 6 to 29 units: 5 points total, no less than 1.5 points per component.
- (3) 30 to 89 units: 6 points total, no less than 1.5 points per component.
- (4) 90 to 199 units: 8 points total, no less than 2 points per component.
- (5) 200 or more units: 10 points total, no less than 2 points per component.

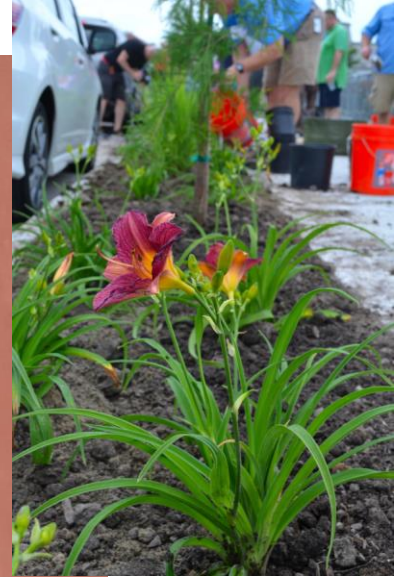
**TABLE 5.12.6: RESILIENT POINT SYSTEM FOR RESIDENTIAL DEVELOPMENT**

Resilient Development Activity	Points Earned
<b>Component 1: Risk Reduction</b>	
Construct building to meet 110-mile wind load design requirements of the VUSBC	2.00
Elevate the ground story finished floor and all significant electrical and mechanical equipment no less than 3 feet above highest adjacent grade	1.00, plus 0.50 per ft. above 3 ft.
Construct an impact-resistant (hail, tree damage) roof	0.50
Install impact (hurricane or wind) resistant windows	0.50
Install operable storm shutters	0.50
Establish operating procedures for how the project will handle loss of off-site or grid power, transition to a backup source of power, and transition back to normal operation	0.50
<b>Component 2: Stormwater Management</b>	
Install a "green roof" on at least 50 percent of the total roof area (25 percent for renovated buildings) and only plant materials permitted in Section 5.2, Landscaping Standards	2.00
Install a "green roof" on at least 25 percent of the total roof area and only plant materials permitted in Section 5.2, Landscaping Standards	1.00



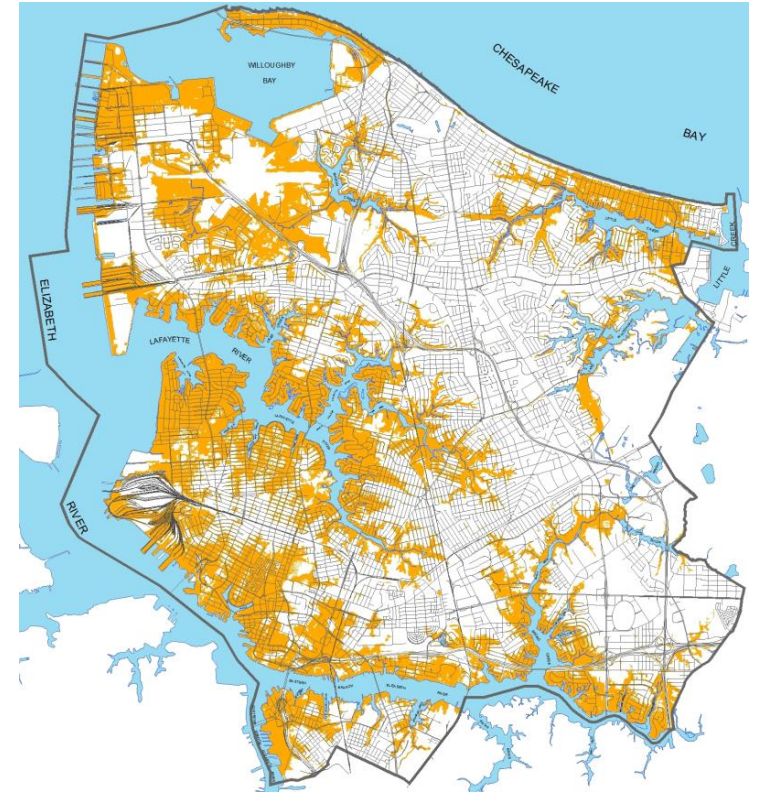
# Resilience Quotient

- Point-based system with many choices
- Intended to be both flexible and impactful
- Provides individuals with opportunity to be part of the solution



# Resilience Overlays

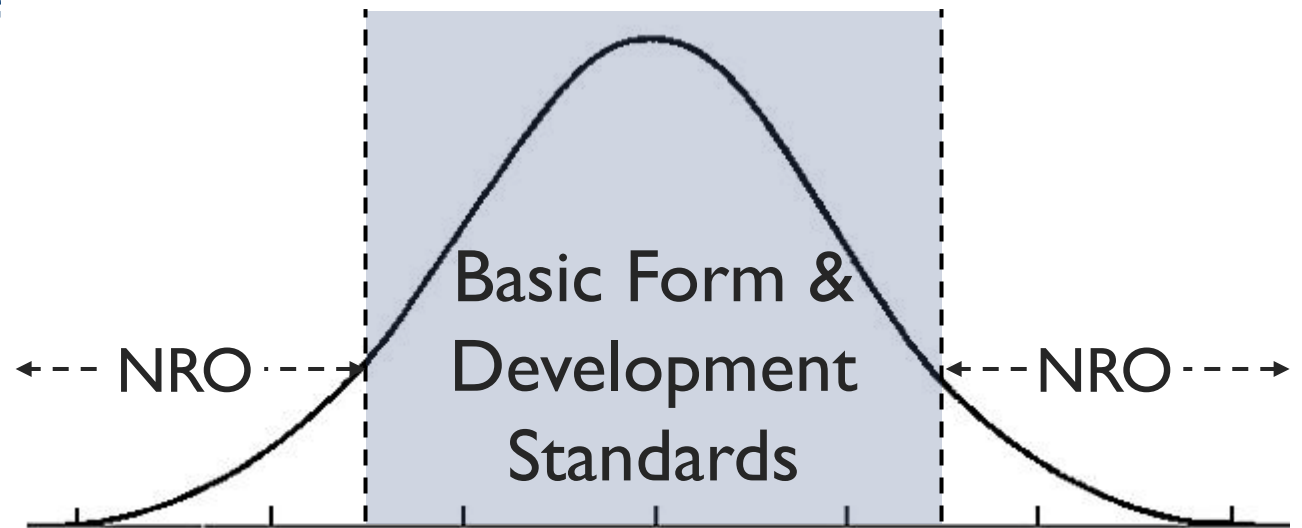
- Coastal Resilience Overlay
  - Applies to high flood risk areas, requiring:
    - Higher first-floor elevations
    - Additional open space and landscaping
    - Additional resilience elements
    - Limits parking and requires pervious materials
- Upland Resilience Overlay
  - Applies outside high flood risk areas
  - Permits reduced resilience requirements in exchange for a conservation easement placed on another, high-risk property





# Resilience Overlays

- Neighborhood Resilience Overlay
  - Designed to support neighborhoods with unique development character
  - Form and development standards can be tailored to fit needs of individual neighborhoods



# Initial Takeaways

- Resilience is more than the new buzzword *du jour*
- Long-term thinking is sometimes easier
- Emphasis on “Whole of Community” has been successful
  - Citizens want to be able to do something
- Climate Change and Sea Level Rise are very real to folks who suffer recurrent nuisance flooding monthly or more frequently





# Questions



# For More Information

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